TRANSTERM 5

USERS MANUAL

COMPUTER**WISE**.

TRANSTERM 5

USER'S MANUAL

Specifications and information
subject to change without notice.

CONTENTS

INTRODUCTION

To ensure your successful use of the TransTerm 5, this handbook contains all the necessary information for installation, interfacing, operation and programming of the terminal.

This manual presents material relevant to the TransTerm 5, 5A, 5B, and 5Cmodels. Most features and capabilities are common to all three models with the TT5 being the basic model and the TT5A having enhancements over and above that of the 5 primarily in the I/O options, and the 5B and 5C are for those configurations which support multiple I/O options. As of March 1998, the 5C has superceded the 5B which has been discontinued.

CHAPTER 1
Functional Overview

The TransTerm 5 is a self-contained keyboard/display data entry terminal which is designed to transmit and receive information interactively with a host computer or with some other similar communications capable device.

Figure 1-1 presents block diagram of the major functional elements of the terminal. Each element of the terminal will be briefly described here.

The **keyboard** is used by the operator to input character codes for transmission to the host computer or, depending upon the mode of operation, for local presentation on the display or local terminal functions. The keyboard is a 24 key sealed membrane switch array with an embossed graphic overlay. Each valid keystroke will be accompanied by an audible “click” sound for positive operator feedback.

The **display** is a two line by twenty-four (48) character electro-reflective liquid crystal display. It can display any of the 96 standard ASCII characters in a 5 x 7 dot matrix font and has a blinking cursor symbol to indicate current character placement. The display has as its primary purpose to visually present to the operator all valid displayable ASCII codes which are received via the Communication port, or are operator entered in Modes 2 and 3. The display is also used to present the terminal setup parameter values to the operator in the setup Mode. A display backlight option is available (a different display module) that incorporates an electroluminescent (electro-chemical) lighting element behind the liquid crystal display. It is preferable to order the TransTerm 5 with the backlight option rather than to add the option after the original purchase.

The **communication port** serves as the interface between the TransTerm 5 and the computer (by direct connection or via a modem). The communication port takes data entered from the keyboard (in Mode 1) or data in the display memory and transmits it in serial asynchronous format at the selected baud rate and character parity. The communication port also de-serializes received data and places it in the input buffer. The standard communication port has an RS-232 serial interface on a DB-25F connector. The port can be optionally equipped with the RS-422 compatible TNET interface for networking applications. The TNET interface signals are available on the standard DB25F connector or the optional RJ45 modular jacks (not available on the TT5-xx models).

The **input buffer** is a 100 (16 characters on the TT5-xx models) character first-in/first-out (FIFO) memory used to temporarily hold data which has been received by the communications port. The received data is subsequently removed from the input buffer and routed to the display buffer or operated upon as in the case for ASCII control codes and ESCape commands.

The **barcode interface** option (Not available on the TT5-xx models) is a built-in interface for a wand barcode scanner or other types of wand emulating scanners, including CCD or laser scanners which posses which will auto-discriminately decode bar code symbols in any one of several symbologies (Code 39, Code 128, Interleaved 2of5, UPC/EAN and CODABAR). The decoded data will be placed on the display screen at the cursor position and/or transmitted out the serial I/O port, depending on the operating mode and setup configuration.

The **magnetic stripe reader interface** option (not available on the basic TT5-xx models) is an integral input interface for the MT-211 magnetic stripe card reader. It is capable of interfacing to a track 2 reader or a track 1 reader on the TT5A model, or a dual track (1 and 2) reader on the TT5B/C models. The data read from the card is translated to ASCII characters and transferred to the display buffer at the cursor position and/or transmitted out the serial I/O port (depending on the operating mode and the setup configuration).

The **auxiliary serial I/O port** option (not available on the basic TT5-xx models) is a built-in interface which supports unidirectional serial communications, at a user selectable baud rate with another RS-232 compatible device.

The TT5A/B/C models can also be equipped with the Pulse Output option and Quad Counter Input option. The TT5B/C models can be equipped with the enhanced auxiliary serial port, the Dual or Quad relay output module, Touch Key Reader Input Option, and Weigand Input Option (some restrictions may apply, please consult the factory about option compatibility).

CHAPTER 2
Installation

GENERAL

This chapter contains information related to the unpacking and installing of the Transterm 5 terminal. The installation procedure includes power application, hookup and power-up checkout procedures.

UNPACKING

The Transterm 5 is packed in a reinforced cardboard carton containing the following items:

TransTerm 5 terminal
AC power adapter
Operator's Manual
Other Optional Accessories

Remove each of the above mentioned items from the box and inspect each item and the box itself for physical damage. Notify the shipper and selling agent immediately of any damage.

* * * * * * * * *
WARNING
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Subjecting the Liquid Crystal Display to temperatures above 70 C or below -20 C for extended periods of time could permanently damage the display.

The Transterm 5 is designed to either set on a horizontal surface such as a desk or work bench (consider the optional "tilt base" for this situation), or to be mounted on a vertical surface (consider using the "tilt bracket" for this situation). There is also a new enclosure specifically designed for wall-mounted applications which has in integral two-piece mounting bracket. You should refer to the instruction leaflet which accompanies that enclosure for its specific mounting procedure. For built-in O.E.M. applications, the terminal can be removed from its standard enclosure and panel mounted behind an appropriately sized cutout using the optionally available bezel kit.

CHAPTER 3
Connection and Power-up

CONNECTION

Depending on your installation requirements (see Chapter 10), connect the cable from your computer or modem to the TransTerm 5 I/O connector (DB-25F) (See Figure 3-1). Next insert the power plug from the wall plug-in power adapter into the jack next to the I/O connector. Plug the power adapter into a nearby 120 VAC outlet. Power is now applied to the unit.

NOTE

The TransTerm 5 has no fuse or power on/off switch. Within one second, three loud beeps will be heard to indicate that a successful power-up reset has occurred and that the unit is ready for operation. If more than three beeps are announced, the terminal is making an exceptional power-on sequence due to there being invalid setup data in the EEPROM.

POWER-UP AND CHECKOUT

Perform the following procedure to power-up and checkout your terminal.

1. Apply power to the unit by inserting the AC power adapter's miniature phone plug into the terminal's power jack. The terminal will report a successful power-up sequence on the display in the following manner:

"TRANSTERM 5x C199x
TT5x Ver x.xx"

2. After a successful power-up, configure the desired set-up features as described in Chapter 6. This would include the adjustment of the display contrast for the viewing angle best suited for the installation situation. The contrast on the TT5B and TT5C can only be adjusted by opening the terminal's enclosure to access a screwdriver potentiometer.

3. The new or modified set-up features will be programmed into the terminal's non-volatile memory.

CHAPTER 4
Communication

GENERAL

The TransTerm 5 can be connected directly to a local computer or to a modem for remote telecommunications.

For direct connection, the standard RS-232 or optional RS-422 interfaces may be used. Generally speaking, the consideration of cable distance is the determining factor in choosing which of the two interfaces is preferred. For a connection of less than fifty feet, the standard RS-232 interface will serve, and for point-to-point connections greater than 50 feet or when multiple terminals are to be communicated with using one serial port, the TNET interface option (RS-422) on each terminal is necessary as is the TIM1B network controller.

SERIAL DATA FORMAT

The Transterm 5x terminal communicates using serial asynchronous data format. Each character is transmitted using a leading start bit, 7 or 8 data bits, a parity bit, and one or two stop bits. The data bits are transmitted and received with the least significant bit first in time sequence followed by the parity bit and the stop bit(s). The terminal's serial receiver needs to receive only one stop bit for proper operation and is unaffected by the receipt of more than one stop bit. The terminal's transmitter always transmits two stop bits and therefore is compatible with a receiver set for either one or two stop bits.

The parity bit is used to detect single bit errors in the received data on a per character basis. The parity selection setup bits in SR1; "PEN", "PS1" and "PS2", enable or disable parity generation and checking and determine the state of the parity (even/odd/mark/space) bit which will be transmitted by the terminal and checked by the receiver.

RS-232 INTERFACE

The TransTerm 5x communication interface signals are available on a connector which is accessible through a cutout in the rear of the unit. The connector is a DB-25 (EIA RS-232 type) female. The addition of either of the optional interfaces (20 ma current loop or RS-422) will not affect the availability or operation of the RS-232 signal interface. The signals and pin assignments for the RS-232 interface and the optional RS422 interface are described in detail in Appendix A.

LOCAL KEYBOARD ECHO

In a typical Mode 1 installation, the TransTerm 5x will transmit and receive data simultaneously. Data entered on the keyboard will be transmitted out the communications port; however, with local echo enabled (LKE), the keyed data is also presented locally on the display in addition to being transmitted.

CHAPTER 5
Keyboard Operation

The TransTerm 5 keyboard delivers operator keyed input to the terminal. In so doing it generates ASCII codes that, depending on the Mode of operation, are either transmitted out the communications port or processed and/or displayed internally within the terminal.

The TransTerm 5 keyboard (See Figure 5-1) is a flat panel membrane keyswitch array organized in a six column by four row array of key elements located on 0.750 inch center-to-center placement. The array is covered by a laminated five-color graphic overlay which also includes a clear window covering the display. The twenty-two main keys on the TransTerm 5 keyboard can generate codes in each of three different manners, by singular depression of the key or by preceding the key depression with a single depression of either the S1 (Red) or S2(Blue) shift keys. For custom applications, the standard 5-color overlay can be replaced by (at the time of order) a window overlay which then allows the purchaser to customize the keyboard legends easily.

Unshifted keys include the nine numerics (**0-9**), **Clear**, **Delete**, **Enter**, **Space** and the eight function keys **F1** through **F8** inclusive. The numeric keys generate the ASCII numeric codes in the range of Hex 30-39. The **Clear**, **Delete**, **Enter** and **Space** keys generate Hex 18, 7F, OD and 20 respectively. The eight function keys can generate up to fourteen characters of ASCII data (only two codes in the TT5-xx model) depending on how they are programmed by the user. The character codes so generated may be regular displayable ASCII or can be control codes (such as the ENTER code) or an escape sequence which will be transmitted or internally interpreted accordingly depending on the current operating mode of the terminal, or a mixture of all of these.

Shifted keys are generated with a two-key-stroke sequence which begins with either the Red “S1” key or the Blue “S2” key. The codes which can be keyed with these two shift keys are as follows:

Shift Key	Codes
S1 Red	A C E G I K M O Q S U W Y “(% = . - * ESC
S2 Blue	B D F H J L N P R T V X Z ‘) $ @ ? + / HEX

CHAPTER 6
TransTerm 5 Set-Up

GENERAL

The TransTerm 5x has many features that can be configured by the user. The TransTerm 5x has standard settings for these operating parameters pre-initialized at the factory as “factory defaults”. The user can change any of these settings to meet the needs of his application. Once modified, the new setup configuration is saved in non-volatile memory that is preserved even when the terminal is turned off. At power-up reset time, the setup values are used to establish the operating characteristics of the terminal. When you are satisfied with the features as selected you may inhibit further setup feature modifications from the keyboard by setting Bit 7 in Register SR3.

****

CAUTION

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Once this bit has been set you must use one of the ESCape sequence commands described in Chapter 8 to regain keyboard access to the Setup Registers (or use the method described in Appendix H).

The setup features are programmed into the setup Registers via key entry through the keyboard. When the two shift keys are actuated in the following order, **S2** (blue) - **S1** (red) - **S2** (blue), the TransTerm 5 will enter the setup mode. Any data, which was on the display will be erased and lost.

SETUP MODE

Once in the Setup Mode, the contents of each setup register is presented to the operator for his/her review along with the option of entering a new set of values into each register. Each register is represented in the form of eight binary digits, each of which, can be either a one or a zero setting. Generally, where applicable, a one ‘1’ will enable a feature and a zero ‘0’ will disable a feature. Each register’s contents is presented on the display in the following format:

```
SR  12345678 12345678
SR1 00101100
```

When you have keyed in the new “1”s and “0”s for the register, depressing the **ENTER**key will cause those bits to be entered into the internal register and the display to advance to the next register. When there are no changes to be made to the bits in an individual register, depressing the **ENTER** key will advance the display to the next register. To exit Setup, press **ENTER** until the display returns to a blinking cursor. The keys on the keyboard which are illegal for the Setup Mode will cause an Audible Beep to be sounded if they are depressed.

Following the last setup register, the display will present several additional prompts to be examined and/or modified. These parameters include the Operating Mode, Unit Address, Total Columns, (and Options in the TT5A ,B, or C).

SUMMARY OF SET-UP FEATURES

Set-Up Register	Bit No.	Name	Model	Function
1	1	BR1		Baud Rate Selection
1	2	BR2		Baud Rate Selection
1	3	BR3		Baud Rate Selection
1	4	PS1		Parity Selection
1	5	PS2		Parity Selection
1	6	PEN		Parity Enable
1	7	DBS		7/8 Data Bits
1	8	CSE		CTS Enable
2	1	EKR		Enable Key Repeat
2	2	LKE		Enable Local Echo
2	3	ELW		Enable Line Wrap
2	4	ENL		Enable New Line
2	5	ELM		Enable Line Mode
2	6	XAL		Send All Data
2	7	AKE		Auto Kbd Re-enable
2	8	EXP		Enable Xon/Xoff
3	1	DKB	A/B/C	Disable Keyboard
3	2	DBT	B/C	Disable Backlight Timeout
3	3	DSK	A/B/C	Disable Shift keys
3	4	DRS		Disable Reset Msgs
3	5	DES		Disable ‘ESC’ Key
3	6	DHX		Disable ‘HEX’ Key
3	7	DSM		Disable ‘SETUP’ Mode
3	8	DRM		Disable ‘RESET’ Mode
4	1-8	—-	A/B/C	See Appendices
5	1-8	—-	A/B/C	See Appendices
6	1-8	—-	B/C	See Appendices
7	1	ETM	B/C	Enable Touch Memory
7	2	WEN	C	Enable Weigand Reader Input
7	3	WFC	C	Enable Weigand Facility Code
7	8	EHM	5B	Enable Display Hide Mode
8	1-4	ECL	B/C	Enable Counter Input Low Detect
8	5-8	ECH	B/C	Enable Counter Input High Detect

A/B/C - Setup bit for TT5A, B, and C models only.

SET-UP BIT DEFINITIONS

BR1, BR2, BR3

Baud Rate — These three bits are used to set the serial bit rate clocking frequency for the terminal's communications port.

BR1	BR2	BR3	TT5/A Rate	B/C Rate
0	0	0	9600	9600
1	0	0	4800	4800
0	1	0	2400	2400
1	1	0	1200	1200
0	0	1	600	19200
1	0	1	300	300
0	1	1	150	150
1	1	1	110	57600

PS1, PS2

Parity Selection — These two bits determine the state of the parity bit for transmitted characters.

PS1	PS2	Parity Bit
0	0	Space
1	0	Mark
0	1	Even
1	1	Odd

PEN

Parity Enable — When PEN is set (1), a parity bit who's state is determined by PS1 and PS2 is appended to the data bits of the transmitted and received data character.

DBS

Data Bit Select — When the DBS bit is set (1), the data bits per character is eight. When DBS cleared (0), the data bits per character is seven. This count excludes the Start, Stop and/or any Parity bit specified. If the PEN bit is cleared (0), and the DBS is cleared (0) (7 bits), then a parity bit of zero is transmitted. If you are using the terminal (TT5A/B/C only) in Mode 3 with UAC's above 127 (decimal), or you are using the broadcast address capability (UAC=255)to display a "clock" on all the TT5A/B/C displays simultaneously, DBS must be set to eight bits per character.

CSE

CTS Enable — When the CSE bit is set (1), the TransTerm 5 logic will sense the state of the CTS signal (RS-232 pin 5) before it transmits data out the communication port. If CTS is false, the transmission will not commence and will be held off until the CTS signal returns to a true state. When the CSE bit is cleared (0), the state of the CTS signal is ignored by the terminal.

EKR

Enable Key Repeat — When EKR is set (1), and a keyboard key is pressed for more than one half a second, the keyboard will generate the same key code repeatedly at a rate of eleven per second until the key is released.

LKE

Local Keyboard Echo — When LKE is set (1), data generated by keyboard entry in addition to being transmitted out the communications port is internally echoed back to the terminal input for effective half-duplex operation.

ELW

Enable Line Wrap — Whenever ELW is cleared (0), and the cursor is on the last character location of the line, the next character placed on the display will overwrite the last character on the current line. If ELW is set (1), and the cursor is on the last character location of the line, the next character will cause the cursor to move to the next line and that character to be placed in the left-most position of the new line. If the cursor is on the bottom line of the display at this occurrence, then the display will scroll up one line unless scrolling is disabled by ELM being cleared (0).

ENL

Enable New Line — When ENL is set (1), it will cause “LF” codes received by the terminal to be interpreted as a “CR” and “LF”. When ENL is cleared (0), the ENTER key will generate a “CR” in Mode 1 and when ENL is set (1), the ENTER key will generate a “CR” and “LF” in Mode 1. If LKE and ENL are both set (1) in Mode 1, then a “CR” will be locally echoed and a “CR” and “LF” will be transmitted.

ELM

Enable Line Mode — When the ELM bit is cleared (0), the display buffer is organized as a fixed page and scrolling is inhibited. The cursor will not advance beyond the last line of the display nor will the top line be lost due to scrolling. In addition, in Modes 2 and 3, when ELM is cleared (0), all keyed data in the display buffer is transmitted when the ENTER key is depressed, and when ELM is set (1), only keyed data on the current line (cursor location) will be transmitted (See XAL bit for additional permutations).

XAL

Send All Data — When the XAL bit is set (1), in Modes 2 and 3 the terminal will transmit all of the data in the display buffer at the time the ENTER key is depressed. When the XAL bit is cleared (0), only the key-entered data in the display buffer is transmitted.

AKE

Auto Keyboard Re-enable — When the AKE bit is set (1) in Mode 2, the terminal will automatically have its keyboard re-enabled after completing transmission of the data for the previous ENTER operation. When the AKE bit is cleared (0), the terminal's keyboard will remain disabled until it has received an ASCII SI code.

EXP

Enable Xon/Xoff Protocol — When the EXP bit is set (1), the terminal will transmit the ASCII XOFF (Hex 13) code whenever the input buffer is full. When the input buffer is again empty the XON (Hex 11) code is transmitted. When the EXP bit is cleared (0), this procedure is disabled.

DKB (A/B/C)

Disable Keyboard — When DKB is set (1), keyboard input will be inhibited. Input from optional interfaces will be permitted. This is normally set and cleared under program control to temporarily accept data solely from the optional input device (TT5A/B/C only).

DBT (B/C)

Disable Backlight Timeout — When DBT is set (1), the backlight for the LC display remains on. When DBT is cleared (0), the display backlight turns off after *** minutes of idle time.

DSK

Disable Shift Keys — When DSK is set (1), the S1 and S2 shift keys are inhibited. This is used primarily to disable the alpha shift inputs from the keyboard. **WARNING** - Setting this bit will lock the user out of the setup mode.

DRS

Disable Reset Messages — When the DRS bit is set (1), the messages presented on the display during the power-up reset sequence will be inhibited.

DES

Disable "ESC" Key — When the DES bit is set (1), the keyboard ESC key (S1 space) entry has no affect.

DHX

Disable Hex Mode — When the DHX bit is set (1), the keyboard's "HEX" key (S2 SPACE) used to enter hexadecimal character code values is defeated.

DSM

Disable Setup Mode — When the DSM bit is set (1), the operator will no longer be able to gain access to the SETUP Mode from the keyboard of the TransTerm 5. You are in effect locked out of the SETUP mode and can no longer modify any of the SETUP registers.

* * * * * * * * * * * *
C A U T I O N
* * * * * * * * * * * *

To re-gain such access, the terminal would have to be connected to another RS-232 compatible ASCII device and the appropriate ESCape Command (See CSB in Chapter 8) would have to be transmitted to the terminal from the attached device to clear the DSM bit and regain keyboard access to the SETUP Mode. If the user is unable to clear the DSM bit remotely, then the user will have to perform one of the procedures outlined in Appendix H.

DRM

Disable Reset Mode — When the DRM bit is set (1), the keyboard entered reset sequence is defeated.

ETM (A/B/C)

Enable Touch Memory Option — When ETM is set (1), and the TransTerm is equipped with the Touch Memory Interface Option, the TransTerm will read Touch memories (coin sized stainless steel cans that are pre-encoded with hexidecimal characters). Touch memories are more durable than barcodes or MSCR cards.

ECL (B/C)

Enable Counter Input Low Detection – Each of the four ECL bits, when set to a one will cause the respective counter input to increment its value upon detecting a high-to-low transition of its input state.

ECH (B/C)

Enable Counter Input High Detection – Each of the four ECH bits, when set to a one (1) will cause the respective counter to increment its value upon detecting a low-to-high transition of its input state.

EHM (B/C)

Enable Hide Mode — When EHM is set (1), the LCD does not display operator entered characters. The LCD displays a special symbol for each key entry to "Mask" the actual data entered. This is for security applications where scanned/keyed codes/passwords are to be protected. EHM is available in Operating Modes 2 & 3.

OPERATING MODE — Enter a value of 1, 2 or 3 (See Chapter 9).

CONTRAST — Enter a value from 1 to 7 followed by the ENTER key and observe display from a comfortable viewing angle for the best contrast. Repeat until satisfactory. Press ENTER to continue.

UNIT ADDRESS — Enter a "UAC" value from 001 to 250 for the Mode 3 address.

TOTAL COLUMNS — Enter a value of 24. (A value of greater than 24 for the TransTerm 5 or 5A will create extra bytes of hidden data storage into which key-entered data can be stored unseen by the terminal operator. This facility might typically be used to key in a hidden password, etc.

OPTIONS — (Not for TT5-xx) Enter a numeric value which will be interpreted by the particular option installed in the TT5A/B/C (bar code interface option, magnetic stripe card reader interface, auxiliary serial port option).

CHAPTER 7
TransTerm 5 Control Codes

The TransTerm 5 recognizes many commands which cause it to take action other than merely placing ASCII codes in the display buffer and corresponding character fonts on the display screen. In this way the host computer can command the terminal to perform special actions such as moving the display cursor about the display, sounding the internal alarm, etc. These control commands are of two types, singular ASCII control codes and Escape sequences (see Chapter 8).

The individual ASCII control codes (Hex 01-1F) are summarized and defined below. All other ASCII control codes are ignored by the terminal.

ASCII	HEX	ACTION TAKEN
NUL	00	Always ignored by the terminal.
ENQ	05	(Mode 3 only) Request terminal to transmit data (depending on the XAL bit) in display memory. If the enter flag is set, the data will be transmitted.
BEL	07	Causes the audio alarm to sound for 250 msec.
BS	08	Will move the cursor one character location to the left, unless cursor is at the left margin.
HT	09	Will move the cursor one character location to the right, unless the cursor is at the right margin.
LF	0A	Moves the display cursor down to next line on the display. If the ENL bit is set, a “CR” and “LF” will be performed.
VT	0B	Move the display cursor up to the top line unless the cursor is already on the top line.
FF	0C	Clears the display and places the cursor on the top line and in the left-most column.
CR	0D	Moves the cursor to the left-most column of the current line.
SO	0E	Disable the keyboard if it is enabled.
SI	0F	Enables the keyboard if it is disabled.

DLE	10	TT5 only	For cursor addressing the DLE is followed by a single character code with a value between Hex 20 and 6F that defines a new cursor location on the display (TT5 only).
DC1	11		XON character to re-enable serial data transmission.
DC2	12	A/B/C	Route received data to the auxiliary serial port output. After this code is received by the terminal, all data received is routed to the optional auxiliary serial port if it is installed.
DC3	13		XOFF character used to disable serial data transmission.
DC4	14	A/B/C	Re-routes received data to the display - Reverses DC2 code.
CAN	18		Clears key-entered data from the display buffer.
EM	19		Sets the “SEND” Flag in Mode 3. Causes any key-entered data to be transmitted in Mode 2.
ESC	1B		Lead-in character for Escape Command Sequences.
DEL	7F		Deletes the character to the left of the cursor from the display buffer and backspaces the cursor.

CHAPTER 8
Escape Sequence Commands

The host computer can issue commands to the TransTerm 5 in addition to the ASCII control characters by using an Escape Sequence Command. The first character of an Escape Sequence is always an ASCII “ESC” Escape code (Hex 1B) followed by one or more displayable ASCII character codes which complete the command (but will not actually appear on the display). A summary of commands is listed below.

ASCII SEQUENCE	COMMAND NAME		ACTION TAKEN
ESC 1	SM1		Set Mode to 1 #
ESC 2	SM2		Set Mode to 2 #
ESC 3	SM3		Set Mode to 3 #
ESC A	TDL		Transmit Current Line
ESC B	TDB		Transmit Display Buffer
ESC C	CDL		Clear Display Line
ESC D	CDB		Clear Display Buffer
ESC E	SSM	A/B/C	Set Suspend Mode
ESC F	CSM	A/B/C	Clear Suspend Mode
ESC G l c	LCA		Load Cursor Address
ESC H	HOM		Home Cursor
ESC K r	TSR	A/B/C	Transmit Setup Register
ESC L d	LDC	A/B/C	Load Display Contrast
ESC M r b	SSB		Set Setup Bit
ESC N r b	CSB		Clear Setup Bit
ESC Q nnn A	LAR	TT5C	Load Unit ADDRESS Value
ESC Q nnn O	LOR	TT5C	Load Options Register
ESC R	TCA		Transmit Cursor Address
ESC S	SVB		Store Setup Bits in EEPROM
ESC V r	TFK		Transmit Function Key Registers
ESC W r xxx	LFK		Load Function Key Registers
ESC X	RST		Terminal RESET
ESC Z	XID	A/B/C	Transmit ID

Escape Sequence Command Definitions

NAME		ACTION TAKEN
ESC 1		**SM1** Set Mode 1 — Causes the terminal to be placed in operating Mode 1 - Teletype Compatible Mode (Valid only after RESET- ESC X).
ESC 2		**SM2** Set Mode 2 — Causes the terminal to be placed in operating Mode 2 - Block Send Mode (Valid only after RESET – ESC X).
ESC 3		**SM3** Set Mode 3 — Causes the terminal to be placed in operating Mode 3 - TNET compatible multidrop/polling mode (Valid only after RESET – ESC X).
ESC A		**TDL** Transmit Display Line — Causes all of the keyed data characters on the current display line to be transmitted to the host computer as a string. The string will be terminated by an ASCII “CR” (Hex OD).
ESC B		**TDB** Transmit Display Buffer — Causes all of the keyed data in the display buffer to be transmitted to the host computer. The line will be terminated by an ASCII “CR”.
ESC C		**CDL** Clear Display Line — The keyed data on the current line in the display buffer will be cleared. The cursor will be positioned at the left most position. This command duplicates the clear key.
ESC D		**CDB** Clear Display Buffer — All keyed data in the display buffer will be cleared and the cursor will be placed at the left-most position.
ESC E	A/B/C	**SSM** Set Suspend Mode — This command causes the terminal (A/B/C only) to enter a suspended mode of operation wherein keyboard input is disabled and the cursor position is saved to allow the host computer to temporarily gain control of the terminal resources needed to place data independently in the display buffer.
ESC F	A/B/C	**CSM** Clear Suspend Mode — This command reverses the effect of the SSM command. The cursor is restored to its original (stored) position and the keyboard is re-enabled.

ESC G l c **LCA** Load Cursor Address — This is a four (4) character (ESC, G, l, c) sequence that allows the host computer to place the cursor anywhere in the display buffer. The third character (l) defines the line number (1 or 2) and the fourth character (c) defines the column number (1-24). The range of l and c are defined below for the various configurations. Any value for l or c that is not in the valid range is defaulted to 1.

Hex Values for l and c

Line	Hex	ASCII	Column	Hex	ASCII
1	20	Space	1	20	Space
2	21	!	2	21	!
			.	.	
			.	.	
			24	37	7

ESC H **HOM** Home — Will move the cursor to the far left column (1) of the top line of the display.

ESC K r **TSR** Transmit Setup Register — This command will cause the terminal to transmit the contents of the setup register specified by "r" (1-5) in the form of eight ASCII "1" and "0" digits that represent the state of each of the eight bits in the respective setup register. Least significant bit first.

ESC M r b **SSB** Set Setup Bit — This command allows the host computer to "set" an individual setup bit which in turn determines the terminal's operating characteristics. The SSB command is a four character sequence (ESC, M, r, b). The third character (r) selects the "register" and must be in the range of ASCII "1" to "8" (Hex 31 - 38). Any invalid values for "r" or "b" will cause this command to have no effect. This command sequence should be used with care to avoid making irreversible changes such as to the baud rate, etc.

ESC N r b **CSB** Clear Setup Bit — This command is used to "Clear" a setup bit. It is a four character command (ESC , N, r, b) as defined for the SSB command.

ESC R **TCA** Transmit Cursor Address — This command is used by the host computer to ascertain the current cursor position. Upon receipt of the command, the TransTerm 5 will transmit its cursor address as a two character response identical to the LCA command.

ESC S **SVB** Store Setup Bits — This command will cause the TransTerm 5 to save its setup bits in permanent EEPROM memory. For the TT5B, this command will also save the Function key registers in EEPROM. For the TT5C, this command will also save the current Operating Mode value in EEPROM thus effective a permanent Operating Mode change for the terminal (See SM1,SM2,SM3).

ESC V r **TFK** Transmit Function Key — This command is used to request the terminal to transmit the contents of designated the function key register (1 through 8) out the communication port. The TT5 transmits the register value in a four character message consisting of the ASCII representation of the hexadecimal values (00-FF) of each of the two bytes of the associated function key register. The TT5A/B transmits the contents of the requested function key register as actual ASCII codes in one continuous string.

ESC W **LFK** Load Function Key — This command modifies the contents of one of the function key registers. The sequence is as follows;

TT5 ESC W r XXXX

"r" Is the function key number (1-8 for F1-F8)

"XXXX" Is the ASCII representation of the hexadecimal values (00-FF) to be placed in the two bytes of the associated function key (each key will hold up to 2 characters).

TT5A/B/C ESC W r d XXXX d

"r" Is the function key number (1-8 for F1-F8)

"d" Is the delimiter code. This code must be at the beginning and end of the character string. This code can be any character not in the string (ie $ or % are good delimiters).

"XXXX" Is the ASCII character string to be stored in the function key (each key will hold up to 14 characters).

The TransTerm requires five milliseconds to load each character.

ESC X **RST** Reset — This command has the same effect as applying power to the unit. A complete terminal reset is performed.

ESC Z A/B/C **XID** Transmit Terminal ID — This command will cause the terminal to send the following ASCII message back to the host computer:

TT5A Vx.xx

where x.xx is the current firmware version (ie. "V3.35").

CHAPTER 9
Operating Modes

All models of the Transterm 5 have three standard operating modes: Mode 1 – Echo-plex mode, Mode 2 - Block Send Mode, and Mode 3 – TNET Multi-terminal Mode. The operating mode of the terminal can be set and/or changed in the SETUP Mode (See Chapter 6) or by receipt of one of three ESCape Commands SM1, SM2 and SM3 , but only at power-up (See Chapter 8).

Mode 1 – Echo-plex Mode

In this mode the terminal operates as a separate display and keyboard. All characters received via the serial communication port are directly displayed or, in the case of control codes, the appropriate action is taken. All data entered on the keyboard causes the corresponding character code to be transmitted out the communication port independently of the receive activity. If Local Echo is enabled (LKE, See Chapter 6), the key entered data will also be locally placed on the display screen.

Mode 2 – Block Send Mode

In the Block Send Mode all received character codes are operated on as in Mode 1. The displayable character codes entered from the keyboard are sent to the display and function keys cause the function to be performed locally within the terminal. Once a message has been entered on the display, depressing the **"ENTER"** key will cause all or part of the entered data (depending on setup bit XAL) to be transmitted out the communication port and the keyboard to be disabled (depending on setup bit AKE). Each line of the transmitted message is terminated with a "CR" or a "CR/LF" depending on setup bit ENL. The keyboard will remain disabled until it is re-enabled by a SI control code from the host computer.

Mode 3 – TNET Multi-terminal Mode

This mode allows up to 250 TransTerm terminals equipped with the optional RS-422 interface (TNET interface) to share a common communication link with a central network controller which is intern attached to a host computer. Each terminal on the network must have a unique address (UAC), as established in the Setup Mode (See Chapter 6), and communication with the TIM1B network controller requires the terminal(s) to be polled by the TIM1B using the "POLLING" sequence. In this manner, each terminal is selected by receipt of the selection character (SOH) followed by the unit address character (UAC). Once selected, the terminal will be able to receive ASCII data in a manner similar to Mode 2. Characters entered from the keyboard are placed into the display buffer locally as in Mode 2. In Mode 3 however, depression of the **"ENTER"** key will only set an internal "SEND" flag and disable the keyboard to prevent further operator input. The key entered data is then requested by the host computer by its sending an ENQ code while the unit is selected as described above. Such data residing in the display buffer is subsequently transmitted by the TransTerm 5 in the order in which it appears on the display. The message is preceded by a STX code and followed by an EOT code. While the unit is selected, receipt of an EM code will set the internal "SEND" flag. Once input data has been received and validated by the network controller, the host computer should re-enable the keyboard by sending a SI code along with the next message sent to the terminal. The terminal will remain selected until the host computer selects another unit, or until a non-existent unit address is selected.

Except for the TT5-xx, all models have a special Mode 3 "Broadcast" feature which allows all the terminals on a TNET network to simultaneously receive an identical message. This is accomplished by selecting address '255', which all the terminals present on a network will recognize, followed by the broadcast message text, etc.. In order for this feature to work, all of the terminals as well as the TIM1B's TNET port must be configured for 8 data bits per character. See Figure 9-1 for additional protocol description.

CHAPTER 10
Communication Protocols

At the higher transmission rates, some of the functions performed by the TransTerm 5 require more time to accomplish than is available between successive received data characters. To avoid loss of data under these circumstances, the TransTerm 5 utilizes a 16 character input buffer operating in a first in/first out (FIFO) fashion. The input buffer could however become full due to one of the following situations:

1). The Host computer has sent successive commands that require considerable execution time (i.e. CDB, SSB, etc).

2). The operator has entered a keyboard function, which keeps the TransTerm 5 busy for an extended period of time (in milliseconds of time frame).

Because the input buffer can “overflow” for one of the above reasons, it is desirable to have a means by which the terminal can regulate the flow of data being sent to it. This capability exists in the TransTerm 5 by the use of one of either of the following methods:

XON/XOFF Protocol

The most efficient and recommended method is the use of the XON/XOFF protocol. Whenever the TransTerm 5 cannot receive any additional data it will transmit an XOFF (Hex 13) code. The sending device should receive and recognize the XOFF code and stop transmitting data to the terminal until it receives and XON (Hex 11) code indicating that the TransTerm 5 is ready to receive more data.

The TransTerm 5 can process incoming data very fast but may need to XOFF the host computer if the 16 (100 in the TT5A/B) character input buffer fills to within 75% of full. When the buffer is depleted back down to within 10% of empty, it will issue the XON to the host computer.

Fill Character Protocol

Because the TransTerm 5 ignores “NUL” (Hex 00) codes, they can be used to “fill” in time or create delays after certain functions or commands. The exact number of fill characters may have to be determined by experimentation because the execution time of some commands may vary with the configuration of the terminal.

CHAPTER 11
INTERFACING

The TransTerm 5 Communications port has an RS-232 compatible 25-pin female connector for establishing the electrical connection with external equipment. The connector is accessible through a cutout in the end of the terminal case. For the TT5A or TT5B models, an RJ-45 compatible modular jack can be provided in place of the DB-25F, and only the RS-422 TNET signals are available.

RS-232 Interface

The standard TransTerm 5 provides the RS-232 compatible communications signals on the appropriate pins of the communications port connector as follows:

Pin #	EIA/Name	Function
1	AA/FG	Frame Ground
2	BA/TD	Transmitted Data
3	BB/RD	Received Data
4	CA/RTS	Request to Send
5	CB/CTS	Clear to Send
7	AB/SG	Signal Ground
20	CD/DTR	Data Terminal Ready

Use of the RS-232 interface should be restricted to fifty foot cable lengths. See Figures 11-1 and 11-2.

NOTE

CTS (Pin No. 5) must be active to allow the terminal to transmit.

CURRENT LOOP Interface (optional for the TT5 and TT5A models only)

The TransTerm 5 communications port may be optionally configured with a twenty-milliamp current loop interface. Both of the transmit and receive loops are optically isolated passive circuits (external loop power required). The following pin connections are required for current loop operation:

Pin #	Name	Function
10	CLR+	Receive Data Loop (+)
11	CLR-	Receive Data Loop (-)
12	CLT-	Transmitted Data Loop (-)
13	CLT+	Transmitted Data Loop (+)
15	CLRO	CL Receiver output*

*Tie to RD (Pin 3) for current loop operation.

NOTE

CTS (Pin 5) must be tied to DTR (Pin 20) for current loop operation.

TNET Interface Option Signals (DB25F connector)

The TransTerm 5 communications port may be optionally configured with a RS-422 compatible Tri-State differential interface for use on the Computerwise TNET shop floor network system. The pin assignments on the DB25F I/O connector for the RS-422 signals are as follows:

Pin No.	Name	Function
22	DTD-	Transmitted Data (-)
23	DTD+	Transmitted Data (+)
24	DRD-	Received Data (-)
25	DRD+	Received Data (+)
16	DRO	RS422 RCVR output*

*Tie to RD (Pin 3) for RS-422 operation.

NOTE

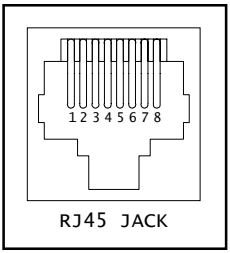
The FG (Pin 1) or SG (Pin 7) to DC ground of the host computer using an additional wire, wire pair or the cable shield, if available,

These connections are accomplished in the TMA1 modular adapter for TNET (Mode 3) operation. More preferable, would be the –M model with a pair of built-in modular jack which eliminates the need for the TMA1 adapter when using modular cable (Category 3 or Category 5).

See Figures 11-4 and 11-5.

TNET Interface Option Signals (Built-in modular jacks)

Pin No.	Name	Function
1	VDC	Power (12Vdc Nom.)
2	GND	Ground
3	DTD	Transmit Data (+)
4	DTD	Transmit Data (-)
5	DRD	Receive Data (+)
6	DRD	Receive Data (-)
7	GND	Ground
8	VDC	Power (12Vdc Nom.)



APPENDIX A
RS-232 Interface Signal List

DB-25F PIN	SIGNAL	DESCRIPTION
1	GND	DC Ground of terminal
2	TD	RS-232 transmit data output.
3	RD	RS-232 receive data input.
4	RTS	Request to send control output.
5	CTS	Clear to send control input. May be used to hold off terminal's data transmission if the CSE flag is Set (1).
7	GND	DC Ground of terminal
20	DTR	Data Terminal Ready control output. High (+12V) whenever terminal is powered on. Also can be used for power input to terminal from a 12Vdc external source.

Signals applicable to the optional 20 ma. current loop interface (Available for TT5 and TT5A only)

10	CLR+	Current loop receive data (+)
11	CLR-	Current loop receive data (-)
12	CLT-	Current loop transmit data (-)
13	CLT+	Current loop transmit data (+)
15	CLRO	Current loop receiver output. Tie to RD pin for current loop operation.

Signals applicable to the optional RS-422 compatible TNET interface with pinouts for the DB25 standard connector and the optional RJ45 modular connector (See Figure 3-1 for modular jack orientation).

16		DRO TNET receiver input. Tie to RD pin for TNET. See TMA1 wiring list.
22	DTD-	TNET Transmit data (-)
23	DTD+	TNET Transmit data (+)
24	DRD-	TNET Receive data (-)
25	DRD+	TNET Receive data (+)

APPENDIX B
Specifications

Display

Super Twist Liquid Crystal Technology. Two lines of 24 character positions capable of displaying 96 ASCII characters (upper and lower case alpha plus numeric and special characters), 5 x 7 dot matrix font, 0.179" high by 0.124" wide (4.55mm x 3.15mm). Blinking cursor symbol. Variable contrast/viewing angle control from keyboard entered setup mode or remotely with Escape command (5A only). Optional electroluminescent backlight available.

Keyboard

24 key membrane keyboard with embossed polycarbonate graphic overlay. Six columns by four rows of hermetically sealed keys on 0.750" center to center placement. Audible key-click for tactile feedback.

Keyswitch travel - .006"-.008" typical.
Actuating force - 4 - 8 ounces typical.
Rated life - 10,000,000 cycles (per switch).

Communication

Serial asynchronous full duplex ASCII coding.
EIA RS-232 compatible interface (DB-25F connector)

Data Format -	1 start bit
	7/8 data bits
	1 Optional parity bit (even, odd, mark, space)
	1 stop bit
Baud rates -	110, 150, 300, 1200, 2400, 4800, 9600, 19.2K

Construction

DESKTOP CASE - Light weight aluminum extrusions on the left and right sides, aluminum front and back panels with top and bottom ABS endcaps.

WALL MOUNT CASE - Structural foam ABS enclosure with aluminum back panel and mounting bracket.

Dimensions

DESKTOP CASE -

Height:	1.75" (44 mm)
Width:	6.9" (175 mm)
Depth:	5.625" (143 mm)

WALL MOUNT CASE -

Height:	9.25" (235 mm)
Width:	8.5" (216 mm)
Depth:	2.0" (51 mm)

Weights

Desktop Case:	1.40 lbs., 620 grams
Wall Mount Case:	2.25 lbs., 975 grams
Power Adapter:	0.50 lbs., 230 grams

Operating Environment

Temperature:	0-60 degrees C (32-120 F)
Humidity:	5% to 95% non-condensing

Storage Environment

Temperature:	-20 to +70 degrees C (-4 to +158 F)
Humidity:	0% to 100%

Electrical power (input to power adapter)

Domestic: 105-125 Vrms, 2-wire	
Overseas:	198-256 Vrms, 2-wire
Frequency:	47-63 Hertz

Power output from power adapter (rated)

Voltage:	12 Vrms AC
Current(Max):	500 milliamps
Rated power:	6 VA

Power Consumptions (from 12Vdc source)

TT5, Basic terminal:	135 ma.
TT5A, Basic terminal:	85 ma.
TT5B, Basic terminal:	85 ma.
Display backlight:	35 ma.
Current loop opt.:	30 ma.
RS-422 TNET opt.:	45 ma.
A300 bar code wand:	35 ma.
Handheld Laser Gun	135-300ma

APPENDIX C
TransTerm 5 A/B/C Bar Code Imterface Option

The bar code interface option for the TransTerm 5A/B/C consists of decoding firmware, additional internal circuit components and a panel mounted connector for attachment of a digital wand such as the Hewlett-Packard HBCS-A300 or equivalent. The operation of the bar code decoding firmware is enabled by set-up bit EOP in SET-UP Register 4. When enabled, the wand decoding firmware converts the received digital data from the attached wand in the form of a series of 1's (for bars) and 0's (for spaces) into ASCII characters in accordance with one of the several symbologies that the bar code option decoder will auto-discriminate (code 39, UPC/EAN, Interleaved 2of5, CODABAR and Code 128). Successfully decoded data will be internally processed by the TransTerm 5A/B just as if it were keyboard entered data, i.e. in Mode 1, wanded data will be transmitted, and in Modes 2 and 3, wanded data will be placed in display memory. If EAE setup bit is set (1), the wanded data will be followed by a "ENTER" code (Hex 0D) in Mode 1, or will be transmitted automatically when wanded if in Modes 2 or 3.

SETUP Registers for the Bar Code Interface Option

TT5A Setup Register #4

Bit#	Name	Function
1	EOP	Enable Bar Code Input
2	EHD	Enable Header Code
3	EAE	Enable Auto-Enter
4	ESS	Enable CODABAR Start/Stop codes
5	EXC	Enable Extended Code 39
6	ECC	Enable Code 39 Concatenation
7	ECS	Enable Code 39 Checksum Validation
8	N/A	Not used

TT5B & TT5C Setup Register #4

Bit#	Name	Function
1	EOP	Enable Bar Code Input
2	EHD	Enable Header Code
3	EAE	Enable Auto-Enter
4	ESS	Enable CODABAR Start/Stop codes
5	EXC	Enable Extended Code 39
6	ECC	Enable Code 39 Concatenation
7	ECS	Enable Code 39 Checksum Validation
8	EMS	Enable M.S. Start/Stop Codes

SETUP Bit Description

EOP

Enable Optional Input — When the EOP bit is set (1), the optional bar code decoding interface is activated. When the EOP bit is cleared (0) the interface is disabled.

EHD

Enable Header Code — When the EHD bit is set (1), the ASCII data which is produced by successfully decoding a barcode symbol is preceded with a Hex 7E code to identify the source of the data as scanned input rather than normal keyboard input.

EAE

Enable Auto-Enter — When the EAE bit is set (1), at the completion of a scan of barcoded data, the terminal will perform an ENTER operation (with different results depending upon the operating mode).

ESS

Enable Start/Stop Codes — When the ESS bit is set (1), the ASCII data from the decoding of the symbol will include the symbol's Start and Stop characters at the beginning and end of the data. In the case of a code 39 symbol, both the Start and Stop characters are an ASCII "*" (Hex 2A). In the case of a CODABAR symbol, the Start and Stop codes are ASCII "A", "B", "C", or "D" (one start code and one stop code).

EXC

Enable Extended Codes — When the EXC bit is set (1), the Code 39 decoding algorithm will also decode extended Code 39 (the full 128 character ASCII set) which uses the $ % / special characters followed by on of the twenty-six alpha codes to derive all 128 possible codes.

ECC

Enable Code 39 Concatenation — When the ECC bit is set (1), the Code 39 decoding algorithm will detect a trailing ASCII space code (last character of the bar code symbol) and after dropping the space character will hold the decoded data so that it can be merged with subsequent decoded data.

ECS

Enable Code 39 Checksum Validation — When the ECS bit is set (1), the Code 39 decoding algorithm will compute the checksum of each decoded symbol and compare it with the trailing checksum character found within the symbol.

MSS

See Magnetic Stripe Reader Interface Option.

TT5A/B/C Setup Register #5

This setup register allows the user to Enable or Disable the various bar code symbologies which are automatically decoded by the TT5A/B bar code interface. By setting a bit to a '1', the specified symbology is enabled, and by setting a bit to a '0', the symbology is disabled. The SR5 bits are assigned as follows:

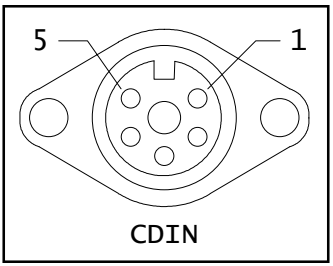
Bit#	Function
1	Enable Code 39 (w/Extended Code 39)
2	Enable CODABAR
3	Enable Interleaved 2 of 5
4	Enable Code 128
5	Enable UPC-A
6	Enable UPC-E
7	Enable EAN/JAN 13
8	Enable EAN/JAN 8

OPTIONS Register

The value in this register sets the length of the Interleaved 2 of 5 symbols which will be recognized by the decoding algorithm. If the value is set to zero, then any length I 2of5 symbol will be allowed. If the register is set to any non-zero value, then only symbols of that exact length (# of digits) will be decoded. The range of acceptable values is from 2 to 32 in even increments.

The electrical connections for the bar code interface option is via a 5-pin round DIN connector which has the following pin/signal assignments:

PIN	SIGNAL
1	5 VDC
2	Input (0-5 pulses)
3	Ground
4	N/C
5	N/C



APPENDIX D
Magnetic Stripe Card Reader Option

The optional Magnetic Stripe Card Reader (MSCR) interface adds the necessary circuitry to the basic terminal to interface a MT-211 read-only magnetic stripe card (credit card, etc.) reader unit to the TransTerm 5A/B/C to capture and decode the data on either Track 2 or optionally Track 1 and convert the data to ASCII. The ASCII data is then processed by the terminal as is key-entered data. The reader is connected to the terminal by a ten inch cable, and if desired, can be mounted on either the side or front of the terminal (add-on charge may apply). See the MT-211 documentation for more information on the operation and use of the reader.

The magnetic stripe reader interface in the TT5A is controlled by settings in Setup Register No. 4 as delineated below.

The magnetic stripe interface in the TT5B or C can be used with either a Track 1 or a Track 2 reader or with a reader which will read both tracks; and in such case, the data read from Track 1 will take precedence over data read from Track 2.

Setup Register Bit Assignments

TT5A SR#4

Bit #	Name	Function
1	—-	Not used by M.S. Opt
2	EHD	Enable Header Code
3	EAE	Enable Auto-Enter
4	EOP	Enable M.S. Input
5	—-	Not used by M.S. Opt.
6	EMS	Enable M.S. Start/Stop Codes
7	—-	Not used by M.S. Opt.
8	—-	Not used by M.S. Opt.

TT5B or TT5C SR#4

Bit#	Name	Function
1	EOP	Enable Optional Input
2	EHD	Enable Header Code
3	EAE	Enable Auto-Enter
4	—-	Not used by M.S.Opt.
5	—-	Not used by M.S.Opt.
6	—-	Not used by M.S.Opt.
7	—-	Not used by M.S.Opt.
8	EMS	Enable M.S. Start/Stop Codes

MSCR interface in the TT5A is configured by the following bits in SR4. The remaining bits in SR4 have no effect.

EOP

Enable Optional Input — When the EOP bit is set (1), the optional magnetic stripe reader interface is activated. When the EOP bit is cleared (0), the interface is disabled.

EHD

Enable Header Code — When the EHD bit is set (1), the ASCII data which is

produced by successfully reading a magnetic card is proceeded with a Hex 7E code to identify the source of the data as being from the reader input rather than keyboard input.

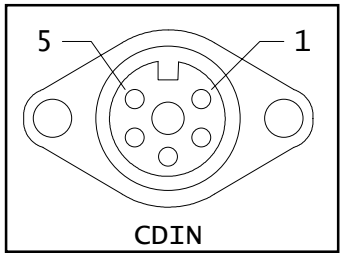
EAE

Enable Auto-Enter — When the EAE bit is set (1), at the completion of a swipe of a magnetic card through the reader, the terminal will perform an ENTER operation (with different results depending upon the operating mode).

EMS

Enable Mag. Stripe Start/Stop Codes — When the EMS bit is set (1), the magnetic stripe decoding algorithm adds the ASCII Start code to the beginning of the decoded data, and adds the ASCII Stop code to the end of the decoded data.

PIN	SIGNAL
1	+5Vdc
2	CLK2
3	GND
4	DATA2
5	CARD2



APPENDIX E
Auxliliary Serial Port Option

GENERAL

The optional auxiliary serial communications port provides a means for the TransTerm 5A, B, or C to either receive or transmit serial asynchronous ASCII data. The TT5A provides a half duplex TTL (5V=space, 0V=mark) for the the input and output signals. The TT5B and C provides full duplex RS-232 communications with built-in hardware and/or software hand shaking.

TT5A Aux Port Operation

The aux serial port in the TT5A can operate in one of three different modes to accommodate most applications. These three modes are described below.

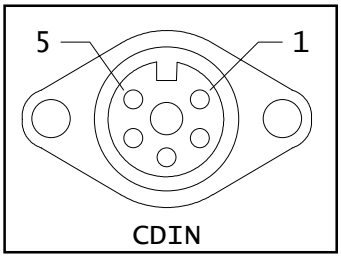
Bi-directional - In this mode, the serial input pin is used to receive data from the aux device and the output pin is used to send data to the Aux device. The port cannot send and receive simultaneously and it is up to the user to make sure that this does not occur, otherwise data will be corrupted.

Output Only - In this mode, the Output pin is used to send serial data to the external device and the Input pin (2) is used as a Clear-to-Send input. When the Input pin is high, output is allowed and when the Input pin is low, output is disallowed.

Input Only - In this mode, the Input pin is used to receive serial data from the external device and the Output pin is used as a Ready signal. The Ready signal is high (+V) when the port is ready to receive data, and it is low when the port is not ready to receive. Ready will go low when the 250 byte input buffer is 3/4 full and will go back high when the buffer is 3/4 empty. This mechanism is used to throttle data transmission from very fast devices. The Ready signal may be tied to the external device's CTS input.

Electrical Interface
The signals for the TT5A Aux port are provided on a 5-pin circular DIN connector. The pin assignments are as follows:

Pin #	Description
1	+5VDC output
2	Serial data input
3	Signal Ground
4	Serial data output



TT5B/C Auxiliary Serial Port Operation

The TT5B/C auxiliary serial port offers more flexibility than the TT5A aux port. The TT5B/C port is full duplex and has built-in hardware handshaking. The port can both receive and transmit data simultaneously, and has two separate 250 byte buffers in which to spool data flow in each direction. Software hand-shaking with X-ON/X-OFF protocol is recognized by the aux serial transmitter and generated by the receive logic. The protocol is enabled and disabled by the **EXP** bit in Setup Register 2.

Communications Format

Data bits/character	- 8
Parity Bit	- None
Stop Bit	- 1
Baud Rate(s)	- 110 to 19,200

SETUP Register Assignments

The auxiliary serial port is configured by the bits in Setup Register 4 of the TT5A or Setup Register 6 of the TT5B and C. The operating mode and baud rate of the auxiliary port are initialized at terminal reset, or power-up. If either value is changed via the Setup mode, the terminal should be reset to invoke the new setup values. TT5A SR#4 is defined as follows:

TT5A SR#4	Bit #			Description
				1 2
				3 Baud Rate
	0	0	0	9600
	1	0	0	4800
	0	1	0	2400
	1	1	0	1200
	0	0	1	19,200
	1	0	1	300
	0	1	1	150
	1	1	1	110
	7	8		Operating Mode
	0	0		Bi-directional
	1	0		Output Only
	0	1		Input Only
	1	1		Not Allowed

TT5B SR#6	Bit	Name	Function
	1	BR1	Baud Rate Selection
	2	BR2	Baud Rate Selection
	3	BR3	Baud Rate Selection
	4	PS1	Parity Selection
	5	PS2	Parity Selection
	6	PEN	Parity Enable
	7	DBS	7/8 Data Bits
	8	CSE	CTS Enable

The above Setup bits have the same definition as those in SR 1.

Software Control

Serial data input via the AUX port is transmitted to the host computer as if it had been entered from the keyboard of the terminal.

Serial data from the host computer is either sent to the display of the terminal or sent to the AUX port. The host computer can direct the terminal where to send data with the following control codes:

DC2 (12H) -> Will direct data from the host computer to the TT5A/B/C AUX port.

DC4 (14H) -> Will direct data from the host computer to the TT5A/B/C display.

All characters received by the terminal after a DC2 will be sent to the AUX port until the terminal receives a DC4.

Auxiliary Serial Port Connector (DE9F) Pin/Signal Definition (TT5B/C only)

PIN #	I/O	DESCRIPTION
1	NC	Carrier Detect
2	I	Receive Data
3	O	Transmit Data
4	O	Data Terminal Ready
5	-	Ground
6	NC	Data Set Ready
7	O	Request To Send
8	I	Clear To Send
9	NC	Ring

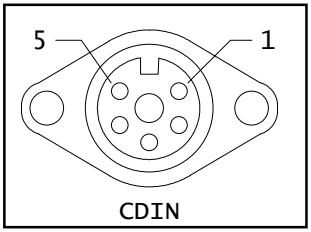
APPENDIX F
Counter Inputs

Counter inputs are available on the TT5A, B and C models. The TT5A supports three counter inputs while the B and C models support four. The counters accumulate count values based on the opening and closing of external dry switch contacts. Each internal counter will count to 99,999,999 decimal. A count is recorded by shorting the counter input signal to DC ground. For each valid count input, the contact must remain closed for a minimum duration of 20 milliseconds. The maximum count rate is 20 counts per second. Escape sequence commands are used to transmit the current count values, clear the counters and determine the switch status (open or closed). The TT5B/C counters support additional commands to load counters with preset values.

TT5A COUNTER INPUT

This option provides three internal counters. The switches interface to the TT5A via a 5-pin DIN connector.

Pin #	Description
1.	Not used
2.	Counter #1 input
3.	Signal Ground
4.	Counter #2 input
5.	Counter #3 input



TT5A COMMANDS - The counters are controlled by ESCape sequences received via the serial port. The terminal responds as follows:

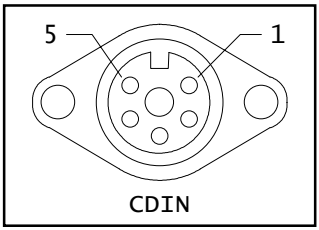
Command	Response
ESC Y 0	Transmits the status of the three switches, “0” for open and “1” for closed. The counter #1 is first, Counter #2 is second and counter #3 is last (out the RS-232 port). Example: 001 (1 & 2 are open, 3 is closed)
ESC Y 1	Transmits the value stored in counter #1 in decimal. First the value is sent (with zeros suppressed) then a carriage return (CR) and optional line feed (LF).
ESC Y 2	Transmits the value stored in counter #2 in decimal.
ESC Y 3	Transmits the value stored in counter #3 in decimal.
ESC Y 4	Clears the value stored in Count #1.
ESC Y 5	Clears the value stored in Count #2.
ESC Y 6	Clears the value stored in Count #3.

Where; ESC = ASCII character (1B Hex)
“Y” = ASCII character (59 Hex)
“0” through “6” = ASCII characters (30 to 39 Hex)

TT5B COUNTER INPUT

This option provides four internal counters. The switches interface to the TT5B via a 5-pin DIN connector.

Pin#	Description
1.	Counter #4
2.	Counter #1
3.	Ground
4.	Counter #2
5.	Counter #3



TT5B COMMANDS - The counters are controlled by ESCape sequences received via the serial port. The terminal responds as follows:

Command	Response
ESC I C	Clears the values stored in all four counters.
ESC I S	Transmits the status of the four switches, "0" for open "1" for closed. Counter #1 is first, Counter #2 is second, Counter #3 is third and #4 is last. (transmitted out the serial port) Example: 0010 (1, 2 & 4 are open, 3 is closed)
ESC I X	Transmits the decimal values stored in all four counters (separated by a space). Example: 25 49 33403 0 (25 in #1, 49 in #2, 33403 in #3 etc)
ESC I 1 C	Clears the value stored in Count #1 (set to zero).
ESC I 2 C	Clears the value stored in Count #2.
ESC I 3 C	Clears the value stored in Count #3.
ESC I 4 C	Clears the value stored in Count #4.
ESC I 1 X	Transmits the value stored in Counter #1 in decimal. First the value is sent (with zeros suppressed) then a carriage return (CR) and optional line feed (LF).
ESC I 2 X	Transmits the value stored in Counter #2.
ESC I 3 X	Transmits the value stored in Counter #3.
ESC I 4 X	Transmits the value stored in Counter #4.
ESC I 1 L ddd a	Loads Counter #1 with the decimal value "ddd".
ESC I 2 L ddd a	Loads Counter #2 with the decimal value "ddd".
ESC I 3 L ddd a	Loads Counter #3 with the decimal value "ddd".
ESC I 4 L ddd a	Loads Counter #4 with the decimal value "ddd".

Where; ESC = ASCII character (1B Hex)
"I" = ASCII character (49 Hex)
"ddd" = 1 - 8 ASCII digits - The value to store in the counter.
"a" = terminating character - If less than 8 digits are to be loaded, any non-digit character will terminate this command. For example, to load Counter #2 with 1050 send:

ESC I 2 L 1050$ (where $ is the terminator)

APPENDIX G
Relays and Relay Drivers

TT5A RELAY DRIVER OPTION

This option provides 12 VDC source to drive a relay from a TransTerm 5A data terminal. This relay could trigger an alarm, light bulb, door opener or larger relay etc. The option provides two output lines from the TT5A, one to connect to the positive terminal of a 12VDC relay, and the other to the negative terminal. The driver is controlled by ESCape commands sent from the host computer. The two output lines exit the TT5A out the back or side of the unit. A relay must be selected that matches the voltage and current requirements of the switched device.

TT5A COMMANDS - The driver is controlled by ESCape sequences received via the serial port. The terminal responds as follows:

Command	Response
ESC P n	If n = 0, the driver stays ON continually. IF n = 1, the driver will pulse for 100ms. IF n = 2, the driver will pulse for 200ms. " " " " " " " " " " IF n = 9, the driver will pulse for 900ms. ("n" is a variable from 0 to 9)
ESC O	Will turn the driver OFF.

Where; ESC = ASCII character (1B Hex)
"P" = ASCII character (50 Hex)
"O" = ASCII character (4F Hex)
"n" = ASCII character (30-39 Hex)

TT5B/C RELAY OUTPUT OPTION

This option provides either two or four internal relays. Each relay can be controlled independently. ESCape sequences sent from the host to the TransTerm can OPEN, CLOSE or PULSE a relay in the TransTerm device. The relay is designed to open a door, flash a light, sound a siren, or trigger a larger relay.

The relays are accessed via a terminal block on the back of the unit. Both relays use dry reed contacts and the maximum contact rating is 10VA (20 VDC @ 500 ma). The maximum switched voltage is 100 VDC.

TT5B/C COMMANDS - The relays are controlled by ESCape sequences received via the serial port. The command is as follows:

Command

ESC J n x

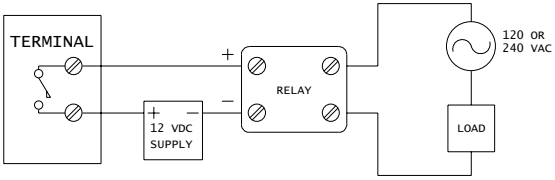
Where; ESC = ASCII character (1B Hex)
J = ASCII character (4A Hex)
n = The relay number (1-4), an ASCII character (31-34 Hex)
x = The relay control (0-9), an ASCII character (30-39 Hex)

The control characters are as follows:

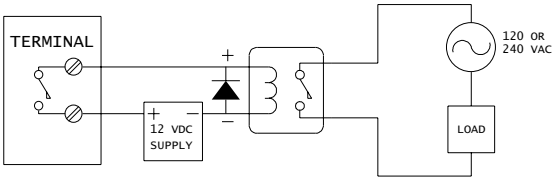
0 = Relay OFF
1 = Relay ON
2 = Relay PULSE for 100 msec
3 = Relay PULSE for 250 msec
4 = Relay PULSE for 500 msec
5 = Relay PULSE for 750 msec
6 = Relay PULSE for 1.0 sec
7 = Relay PULSE for 1.5 sec
8 = Relay PULSE for 2.0 sec
9 = Relay PULSE for 2.5 sec

EXAMPLES OF THE USE OF AN EXTERNAL RELAY TO SWITCH A LARGER LOAD

Connecting the TT5B/C Relay Outputs to an external solid state relay or mechanical relay.



Solid State Relay



Mechanical Relay

Potter & Brumfield Solid State Relay	Potter & Brumfield Mechanical Relay
SSR-240D25	KUP-11D15-24
SSR-240D50	KUP-14D15-12
SSR-240D110	KUP-17D15-12
SSR-480D110	

APPENDIX H
Resetting Factory Default SETUP Values

In certain circumstances, due to known or unknown causes, the TT5/5A/5B may fail to operate properly, or may become locked out of the SETUP mode because Bit 7 of Register 3 has been set to a '1'. In either of these situations, the following procedure(s) will clear the terminal's setup memory and reprogram it with the original setting that it contained when it arrived from the factory.

TransTerm 5 Procedure.

1. Disconnect TT5 from power.
2. Remove right side endcap and back panel.
3. Install a jumper between pins 1 and 20 of the 40-pin LSI IC controller.
4. Apply power to TT5 and wait for power-up reset to complete.
5. Remove power from TT5.
6. Remove jumper installed in step 3.
7. Re-assemble enclosure.
8. Restore TT5 SETUP to your requirements.

TransTerm 5A/B Procedure.

1. Disconnect TT5A/B from power.
2. Press and hold both the S1 (Red) and S2 (Blue) keys.
3. Apply power to the TT5A/B, wait for power-up reset to complete.
4. Release S1 and S2 keys.
5. Remove power from TT5A/B.
6. Apply power to TT5A/B.
7. Restore TT5A/B SETUP to your requirements.

APPENDIX I

ASCII Character Set

Char	Decimal	Hex	Octal	Char	Decimal	Hex	Octal
NUL	00	00	000	@	64	40	100
SOH	01	01	001	A	65	41	101
STX	02	02	002	B	66	42	102
ETX	03	03	003	C	67	43	103
EOT	04	04	004	D	68	44	104
ENQ	05	05	005	E	69	45	105
ACK	06	06	006	F	70	46	106
BEL	07	07	007	G	71	47	107
BS	08	08	010	H	72	48	110
HT	09	09	011	I	73	49	111
LF	10	0A	012	J	74	4A	112
VT	11	0B	013	K	75	4B	113
FF	12	0C	014	L	76	4C	114
CR	13	0D	015	M	77	4D	115
SO	14	0E	016	N	78	4E	116
SI	15	0F	017	O	79	4F	117
DLE	16	10	020	P	80	50	120
DC1	17	11	021	Q	81	51	121
DC2	18	12	022	R	82	52	122
DC3	19	13	023	S	83	53	123
DC4	20	14	024	T	84	54	124
NAK	21	15	025	U	85	55	125
SYN	22	16	026	V	86	56	126
ETB	23	17	027	W	87	57	127
CAN	24	18	030	X	88	58	130
EM	25	19	031	Y	89	59	131
SUB	26	1A	032	Z	90	5A	132
ESC	27	1B	033	[	91	5B	133
FS	28	1C	034	\	92	5C	134
GS	29	1D	035	]	93	5D	135
RS	30	1E	036	^	94	5E	136
US	31	1F	037	_	95	5F	137
SP	32	20	040	‘	96	60	140
!	33	21	041	a	97	61	141
“	34	22	042	b	98	62	142
#	35	23	043	c	99	63	143
$	36	24	044	d	100	64	144
%	37	25	045	e	101	65	145
&	38	26	046	f	102	66	146
‘	39	27	047	g	103	67	147
(	40	28	050	h	104	68	150
)	41	29	051	i	105	69	151
*	42	2A	052	j	106	6A	152
+	43	2B	053	k	107	6B	153
,	44	2C	054	l	108	6C	154
-	45	2D	055	m	109	6D	155
.	46	2E	056	n	110	6E	156
/	47	2F	057	o	111	6F	157
0	48	30	060	p	112	70	160
1	49	31	061	q	113	71	161
2	50	32	062	r	114	72	162
3	51	33	063	s	115	73	163
4	52	34	064	t	116	74	164
5	53	35	065	u	117	75	165
6	54	36	066	v	118	76	166
7	55	37	067	w	119	77	167
8	56	38	070	x	120	78	170
9	57	39	071	y	121	79	171
:	58	3A	072	z	122	7A	172
;	59	3B	073	{	123	7B	173
<	60	3C	074	|	124	7C	174
=	61	3D	075	}	125	7D	175
>	62	3E	076	~	126	7E	176
?	63	3F	077	DEL	127	7F	177

Product Warranty

This equipment is warranted to be free from material defects and faults of workmanship for a period of 90 days from the date of original purchase. At our option, Computerwise agrees to repair or replace any such defective equipment.

This warranty is limited to defects arising under normal usage and does not cover malfunctions or failures resulting from the misuse, abuse, neglect, alteration, modification, or repairs by other than Computerwise or its authorized service agent(s). This warranty does not cover damage to the membrane keyboard. NOTE: Repair or replacement is the sole remedy hereunder.

This limited Warranty is in lieu of all other warranties, expressed, implied, or statutory, including any warranties of merchantability or fitness for a particular purpose, and extends to the original Buyer alone. In no event shall Computerwise, Inc. be liable for lost profits or any incidental or consequential damages caused by this equipment or related software, regardless of whether Computerwise is forewarned of such possibility of damages.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts. If you are a resident of such a state, the above limitations or exclusions may not apply to you. This warranty gives you specific legal remedies, and you may also have other rights which may vary from state to state.

To obtain warranty service during the warranty period, you must contact Computerwise and notify us of the exact nature of the failure along with the model and serial number of the piece of equipment (if applicable).

FCC Compliance

This equipment radiates radio frequency energy and if not installed and used in accordance with the instructions in this manual may interfere with local RF communications. It has been tested and found to comply with the limitations for a Class B computing device pursuant to Subpart J of Part 15 of the FCC Rules for commercial environments. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be necessary to correct or mask the interference by one or more of the following measures:

* Reorient the receiving antenna.

* Relocate the product with respect to the receiver.

* Move the product away from the receiver.

* Plug the product into a different AC power outlet.

If the above measures fail to solve the interference problem the user should consult the dealer or an experienced RF technician for additional suggestions. The user may find the
following FCC booklet helpful:

"How to Identify and Resolve Radio-TV Interference Problems"

This booklet may be ordered from the U.S. Government Printing Office.
Washington, D.C. 20402. STOCK No. 004-000-00345-4.